

July 29, 2016



May 5, 2017

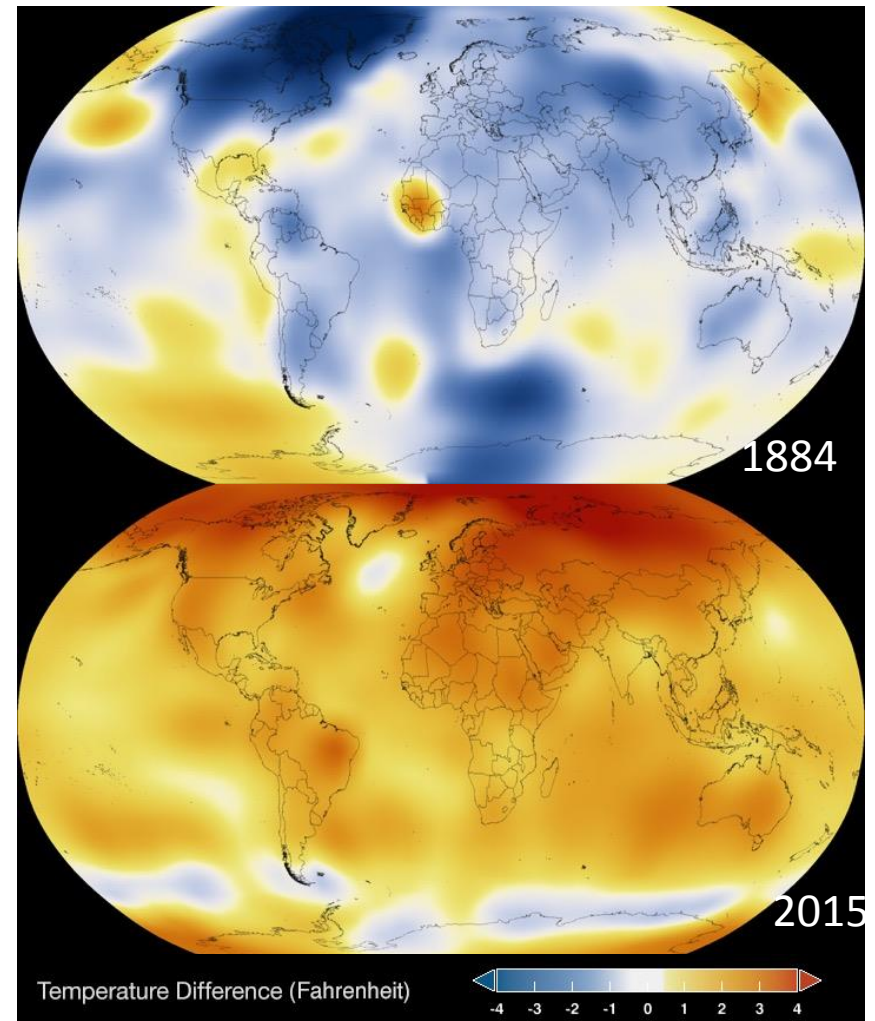
Delaware's Climate: Past, Present, and Future

Delaware Climate + Health Conference

June 6, 2017

There's something happening here...

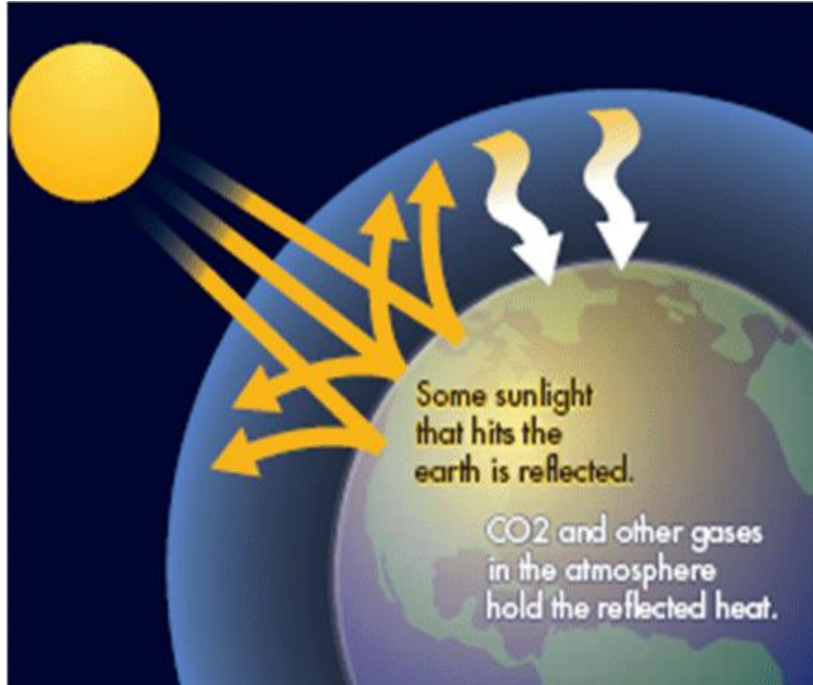
- 2016 was warmest year on record globally
- 16 of 17 warmest years globally have occurred since 2001
- Global average temp in 2016 was 1.78 degrees warmer than mid-century mean



Images courtesy of NASA

What do we know about climate change?

The science is clear:



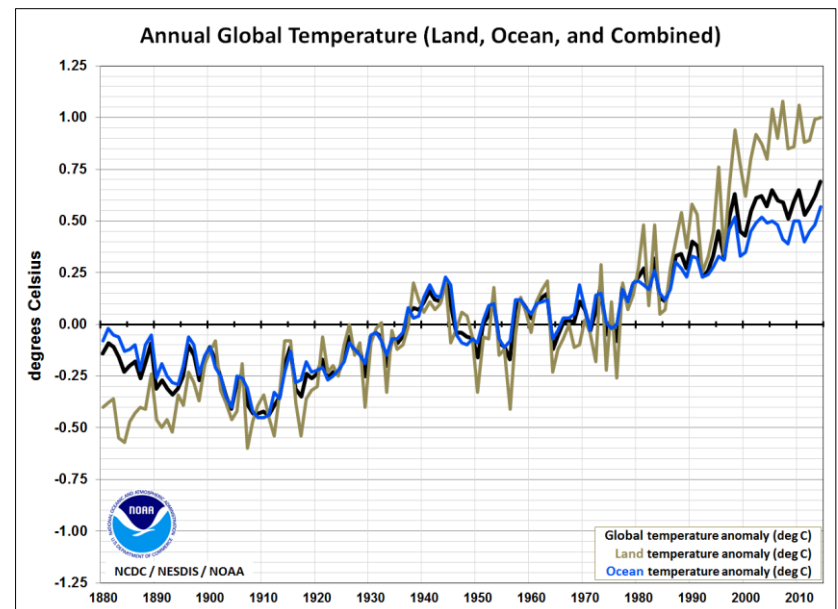
Source: U.S. Department of Transportation,
Federal Highways Administration

- Carbon dioxide and other greenhouse gases act to warm the planet.
- The Earth has been warming during the past century. The amount and speed of the warming is unusual compared to past records.
- If emission rates continue, the warming in the 21st century will be much more significant than the warming in the previous century.
- Increases in temperature in the atmosphere contribute to changes in global climate patterns.

Global changes:

Temperature and Precipitation

- Some extreme weather and climate events have increased in recent decades.
- Heat waves have become more frequent and severe, while periods of extreme cold have become less frequent.
- The amount of precipitation falling in the heaviest downpours has increased in many regions.



What are the impacts of a changing climate?

- Increasing temperatures
- Changes in precipitation
- Sea level rise
- Flooding



How does climate change affect Delaware?

- Public health and safety
- Water supply and quality
- Agriculture
- Natural resources
- Infrastructure



What does climate change mean for Delaware?

Increasing Temperatures



Averages:

- Have already increased by 2°F since 1900.
- Are expected to increase by another 2.5 to 4.5 degrees by mid-century (2050).

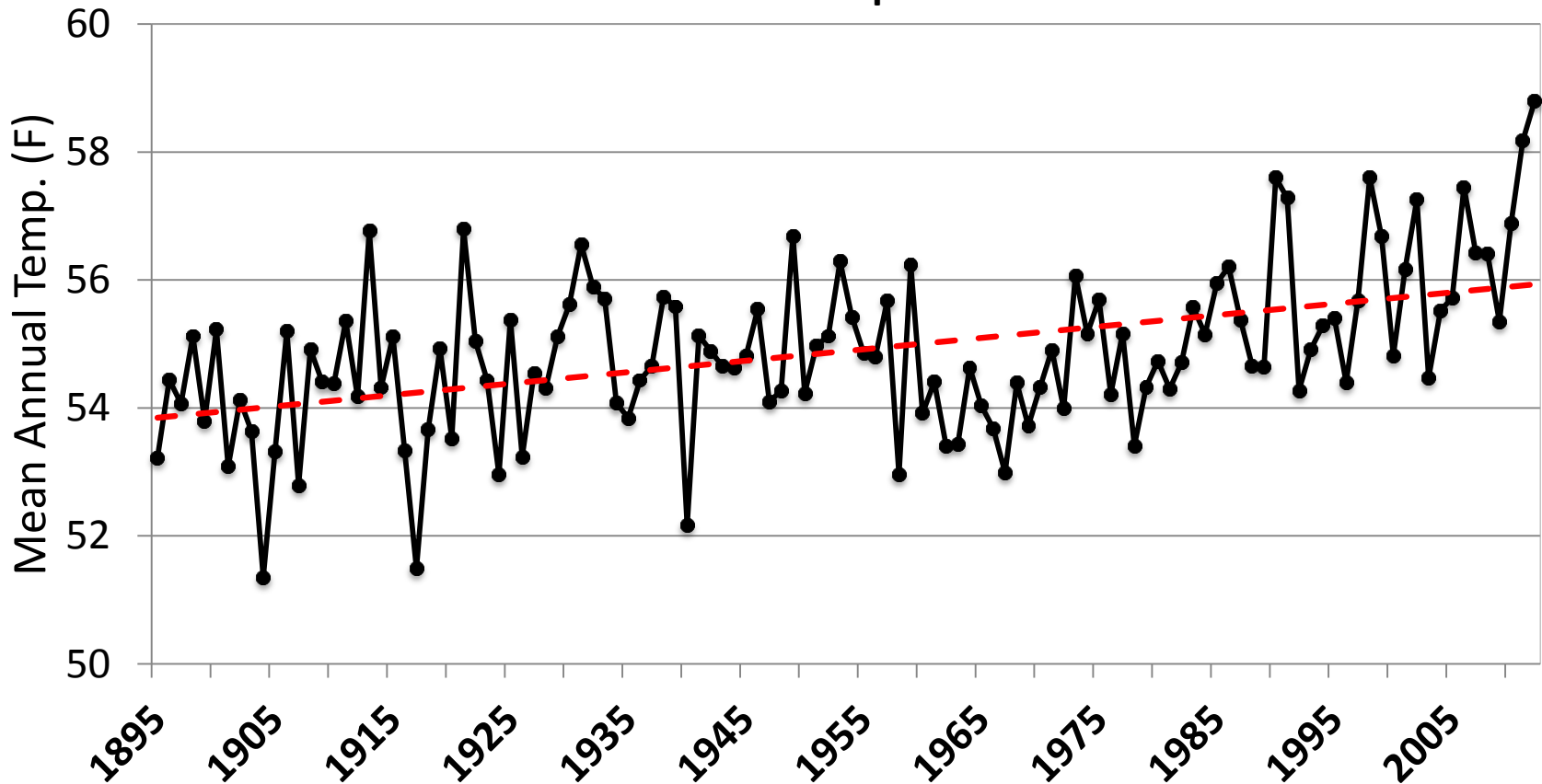
Extremes:

- Higher summer temperatures and longer frost-free seasons are already being recorded.
- The number of extreme heat days is expected to increase

Trend: Temperature is increasing

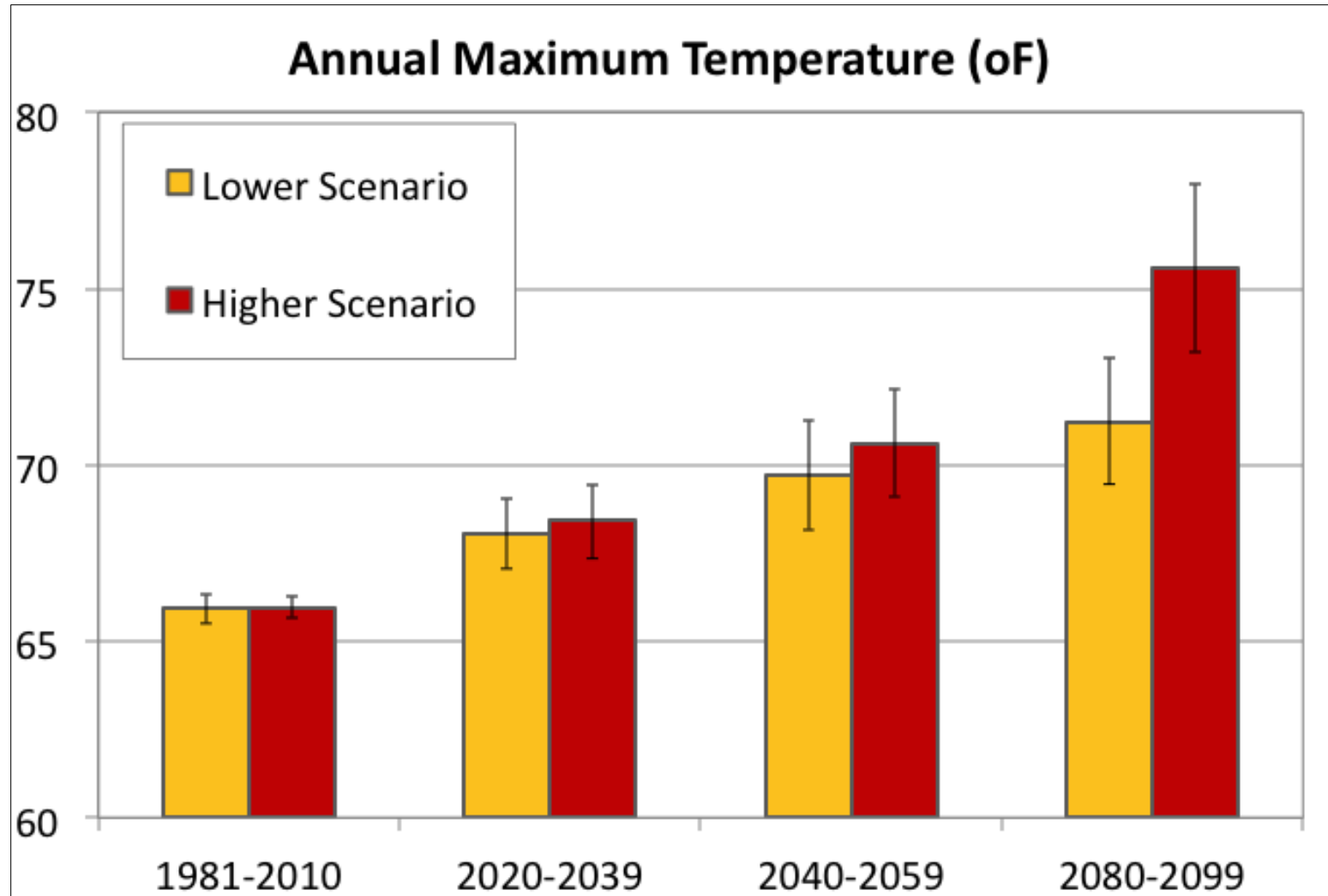
+0.2°F per decade in every season but Fall

Statewide Mean Annual Temperature 1895 - 2012



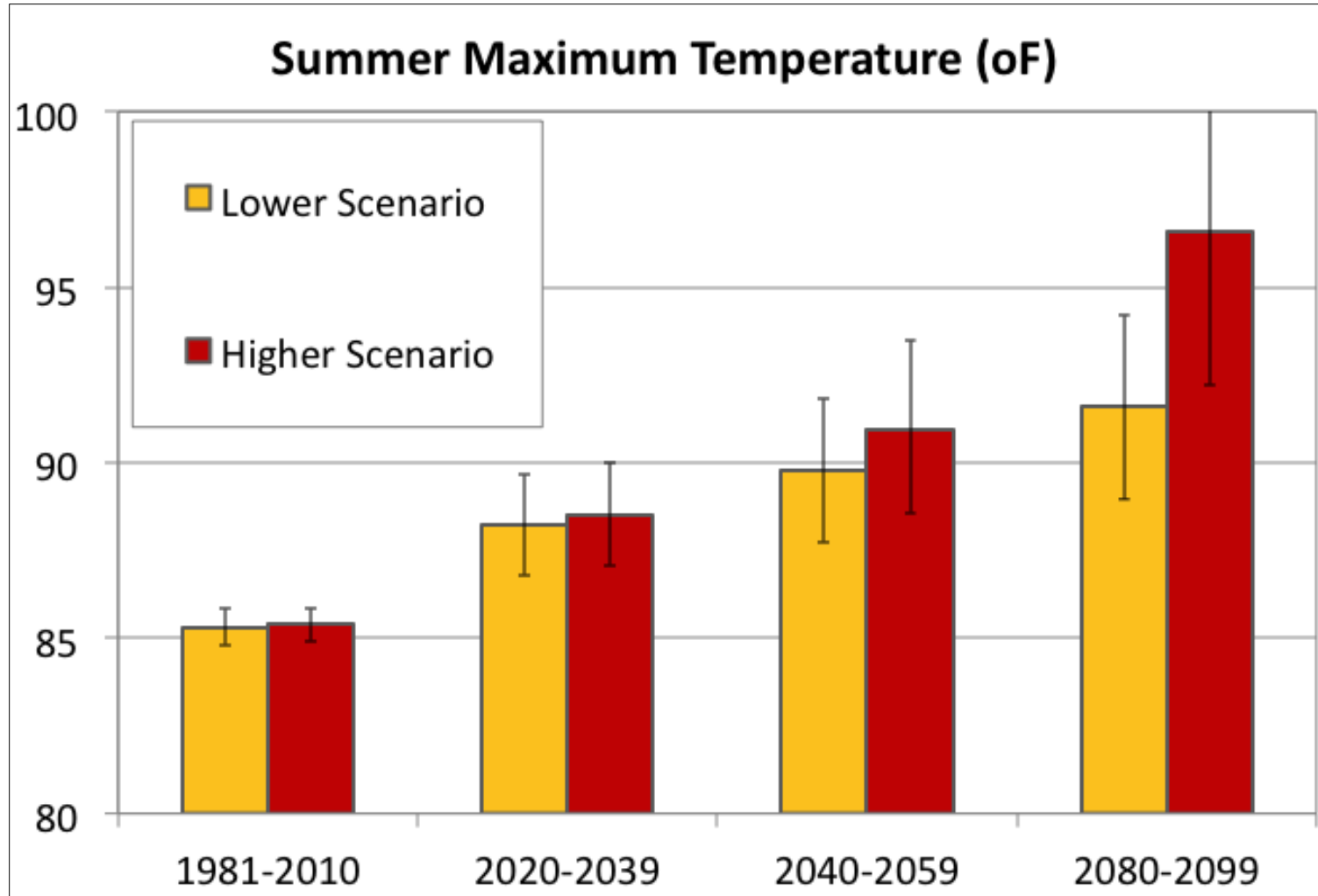
Source: Dr. Daniel J. Leathers, State Climatologist

Projection: Temperature will continue to rise



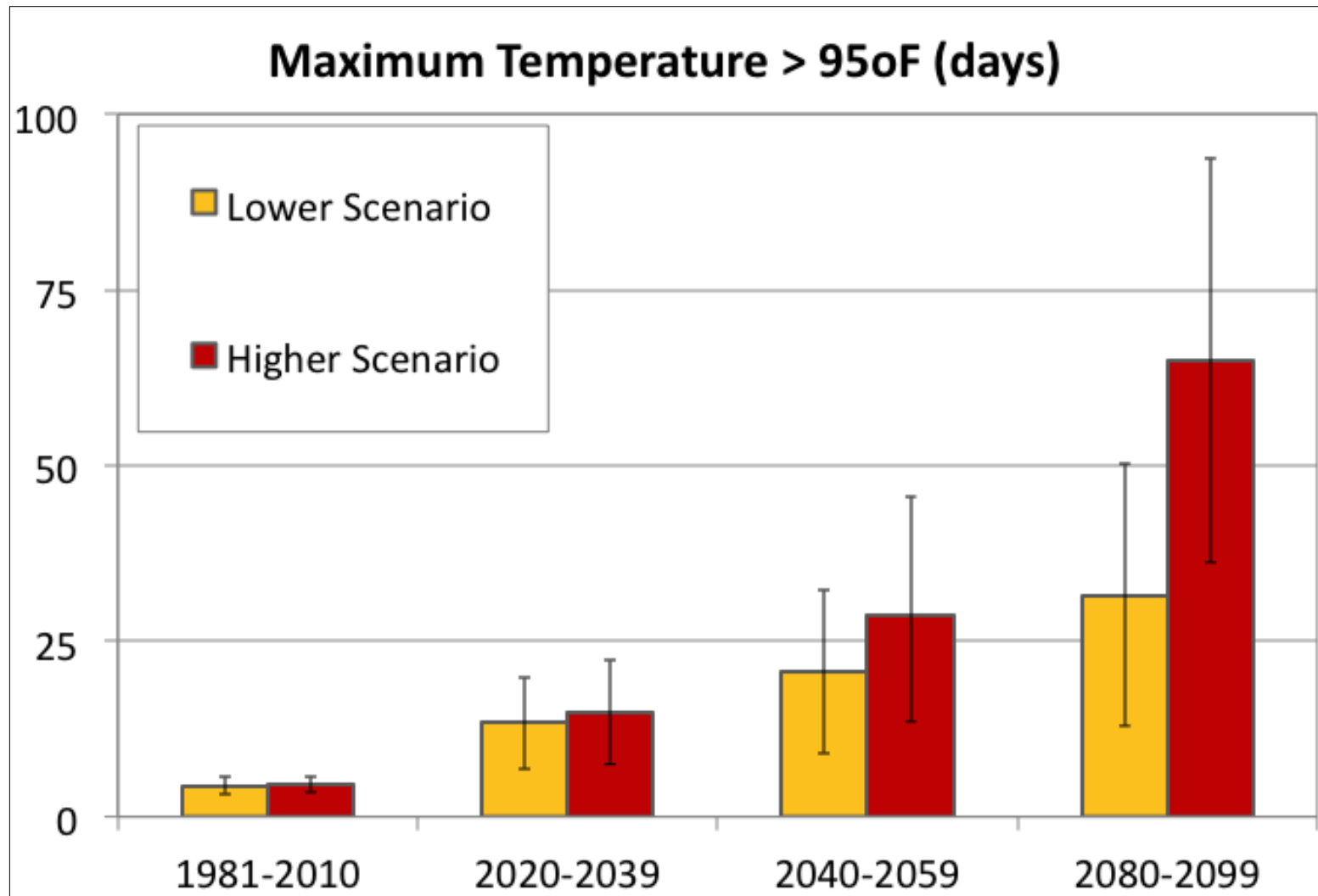
Source: Dr. Katharine Hayhoe, et al

Projection: Larger temperature increases in summer



Source: Dr. Katharine Hayhoe, et al

Projection: More days above 95 F°



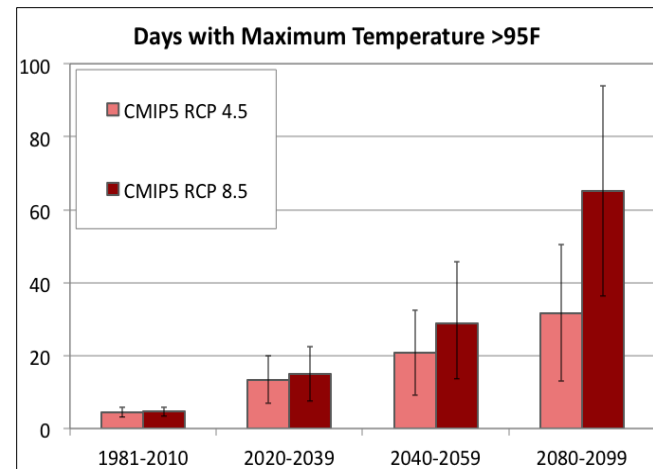
Source: Dr. Katharine Hayhoe, et al

Assessment Findings: Temperature

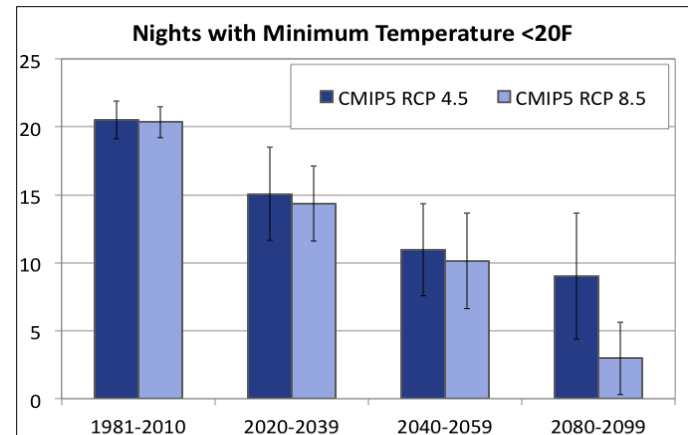
Annual and seasonal temperatures are projected to increase, with slightly greater increases in summer as compared to winter.

Extreme heat days and heat waves are becoming more frequent; extreme cold, less frequent.

Number of Hot Days per Year



Number of Cold Nights per Year



What does climate change mean for Delaware?

Changes in Rainfall

Variability:

- Rainfall is already extremely variable in Delaware, with an average of 44 inches per year.
- Average precipitation could increase by 10 percent by the end of century.

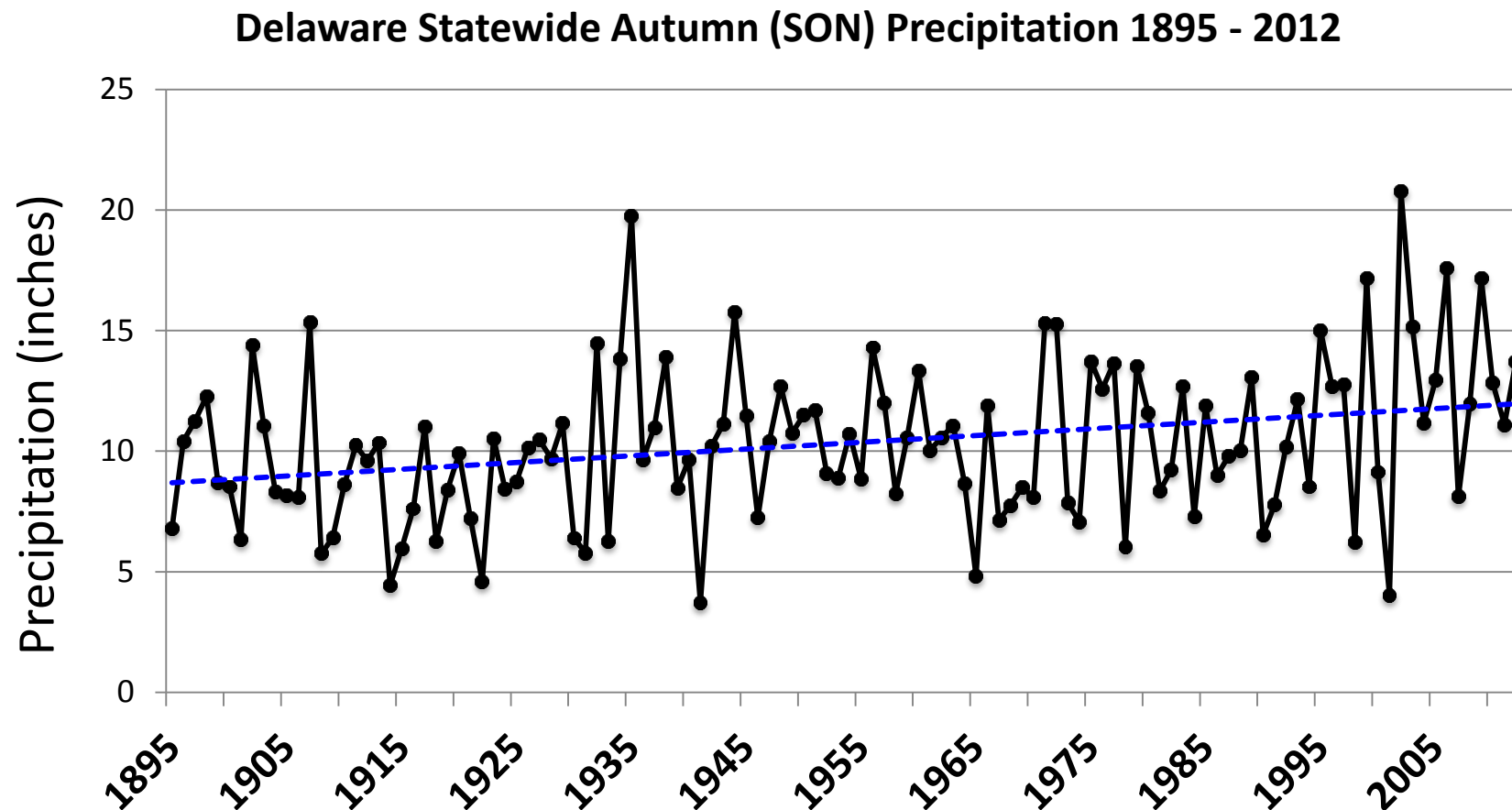
Intensity:

- Heavy rainstorms are expected to become more frequent and more intense – bringing increased flood risks.



Trend: Fall precipitation has increased

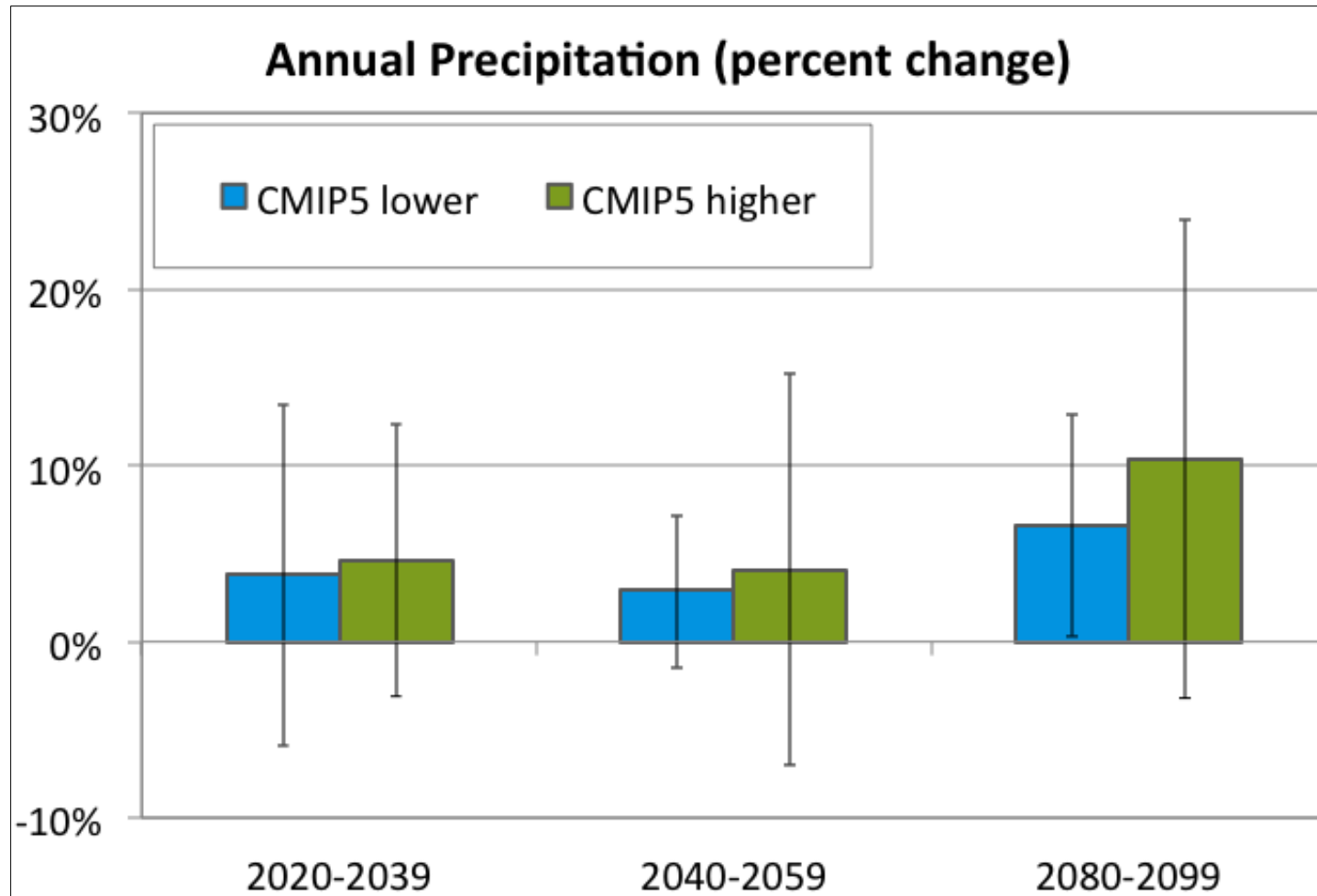
An upward trend in autumn precipitation since 1895.... $+0.27''$ / decade



Source: Dr. Daniel J. Leathers, State Climatologist

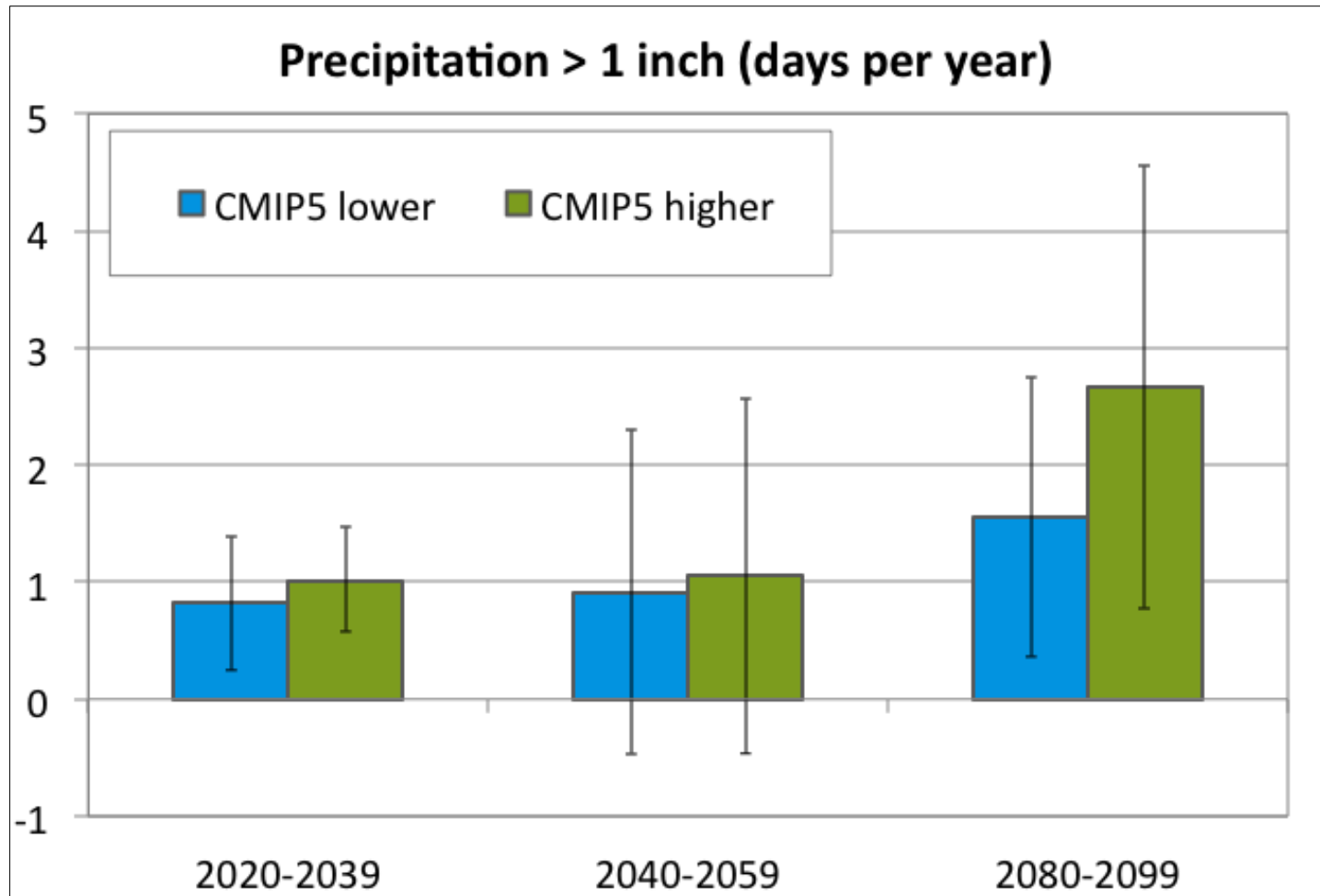
Projection: Annual precipitation increases

Primarily due to increases in winter and fall precipitation.



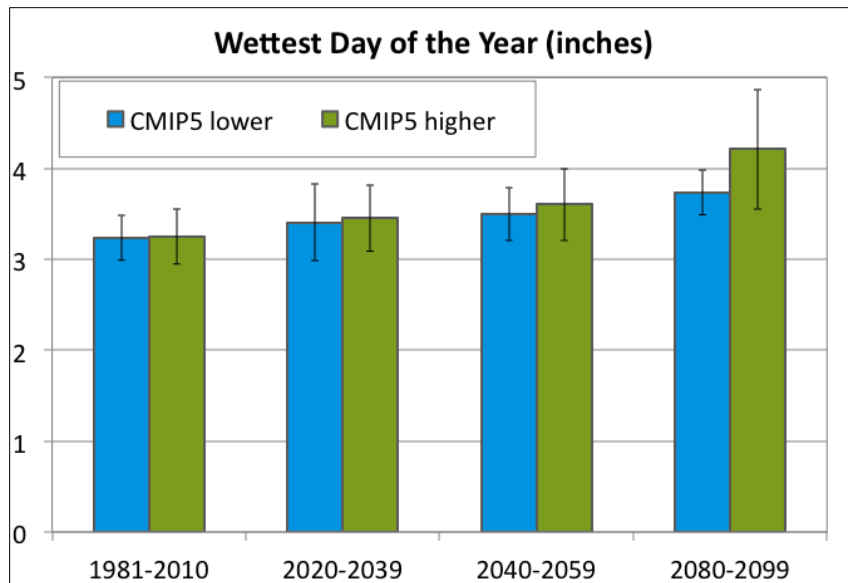
Source: Dr. Katharine Hayhoe, et al

Projection: Days of heavy precipitation increase



Source: Dr. Katharine Hayhoe, et al

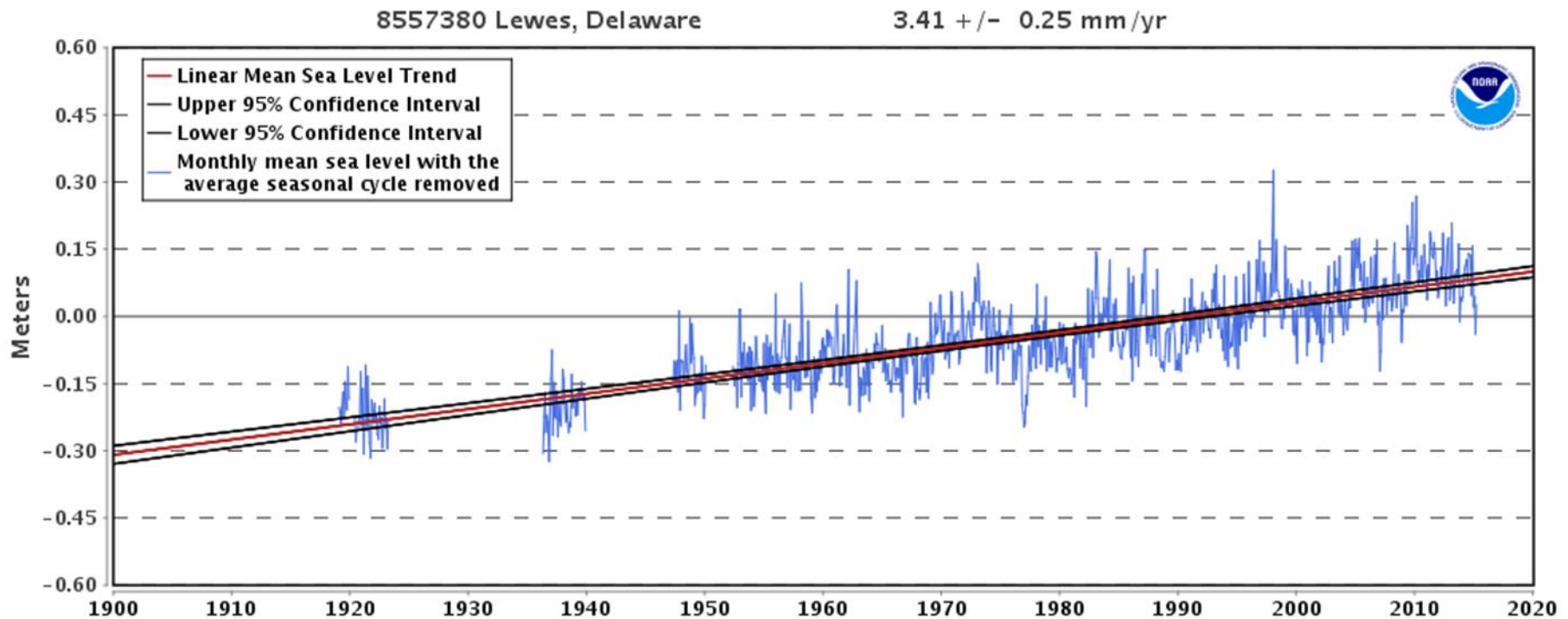
Assessment Findings: Precipitation



Annual precipitation projected to increase, mostly due to changes in winter and fall

Heavy precipitation days are expected to become more frequent but there will still be dry days

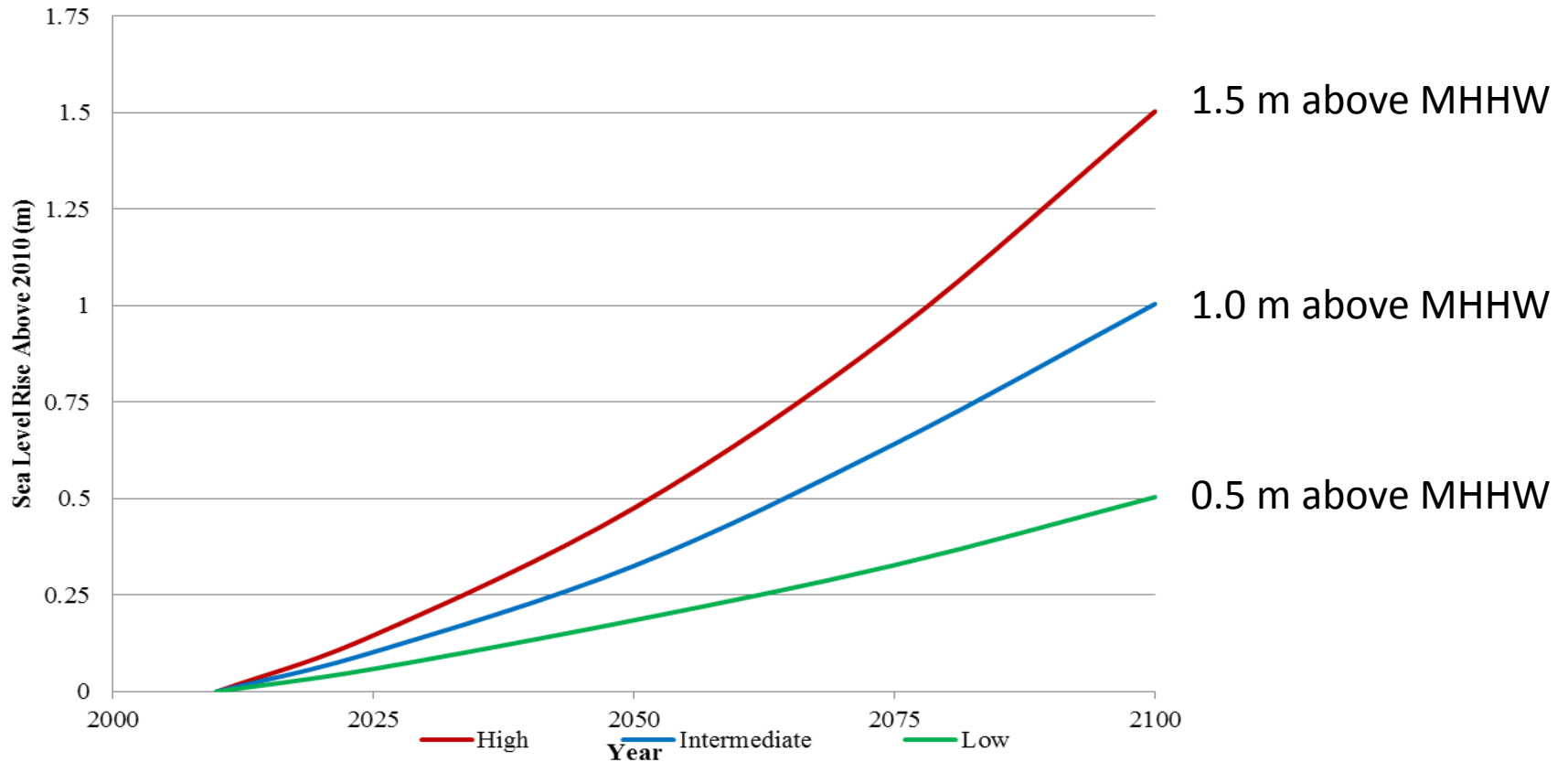
Local sea levels are rising at twice the global average



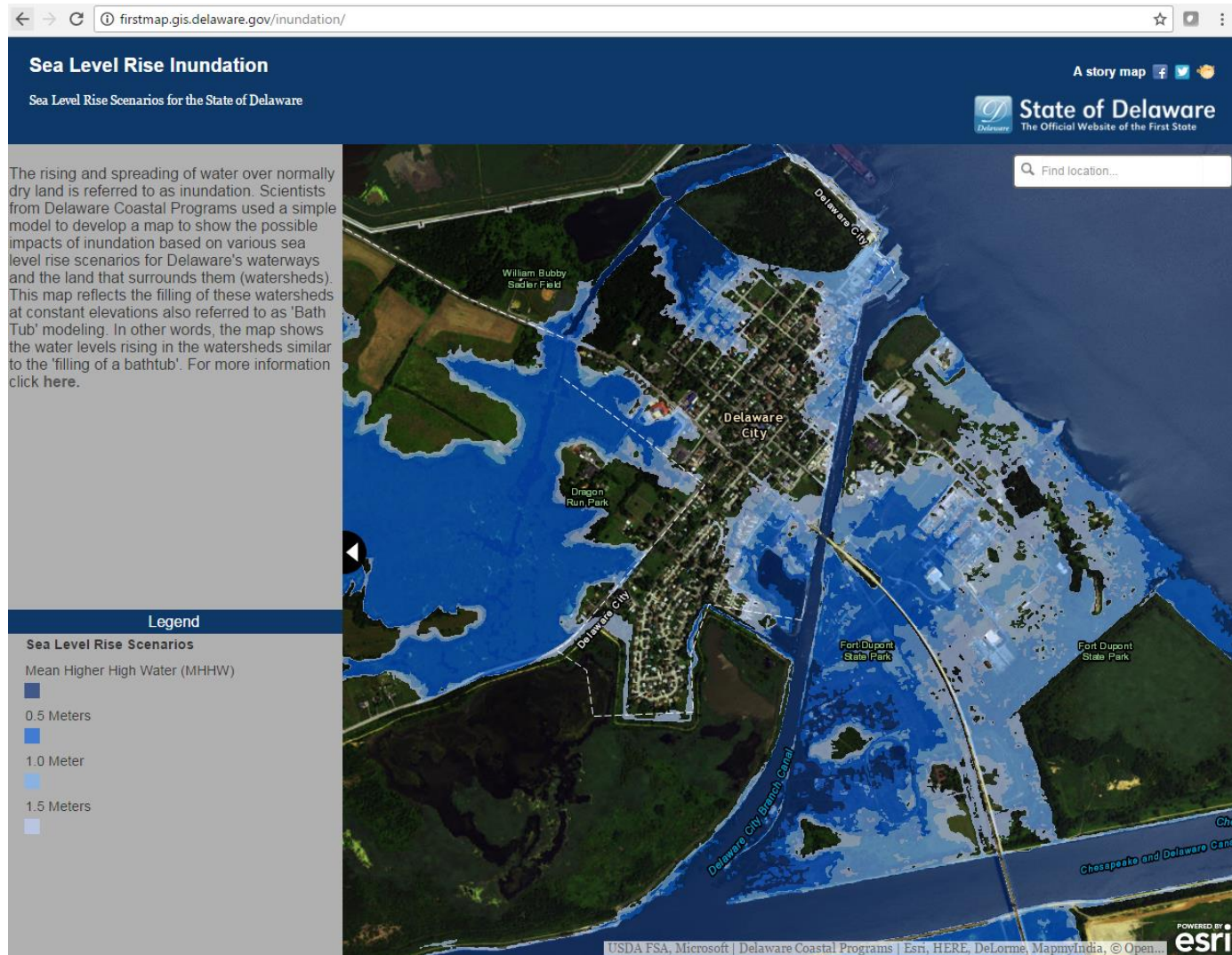
Global rate = 1.7 mm/yr

The rate of sea level rise is very likely to accelerate in the future

DNREC Sea Level Rise Scenarios



Sea Level Rise will affect all of Delaware (www.de.gov/slrmmap)





What do these changes mean for Delawarean's health?

Increasing temperatures

Direct and serious impacts on human health, particularly for vulnerable populations

→ increasing heat-related illnesses, hospitalizations, and deaths

Indirect impacts on human health

→ worsening air quality by exacerbating conditions that produce ground-level ozone

→ longer warm season producing more mosquitos and ticks



What do these changes mean for Delawarean's health?

Increasing temperatures	Changes in precipitation
Direct and serious impacts on human health, particularly for vulnerable populations → increasing heat-related illnesses, hospitalizations, and deaths	Increasing precipitation and sea level rise → rising groundwater levels, leading to failure of septic drain fields → potential impacts to groundwater quality and access to safe drinking water
Indirect impacts on human health → worsening air quality by exacerbating conditions that produce ground-level ozone → longer warm season producing more mosquitos and ticks	Extreme rain events → stress capacity of stormwater and wastewater outfalls, causing water to back up, potential transport of polluted water → increased exposure to pathogens and risk of water-borne illnesses

Thank you!

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